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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/082,101	02/26/2002	Hajime Kimura	740756-2444	3503

31780 7590 12/16/2005

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EXAMINER	
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ART UNIT	PAPER NUMBER
2625	

DATE MAILED: 12/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/082,101	KIMURA, HAJIME	
	Examiner	Art Unit	
	Sath V. Perungavoor	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 September 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *11-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *11-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

[1] A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 29, 2005 has been entered.

Response to Arguments

[2] Presented arguments have been fully considered, but are rendered moot in view of the new ground(s) of rejection.

Claim Objections

[3] Claim 20 is objected to because of the following informalities: there is no antecedent basis for a "first image signal". For examining purposes, the Examiner will assume the applicant intended to include a recitation similar to that of claim 19. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

[4] Claims 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spivey et al. ("Spivey") [US 5,886,353] in view of Sakai et al. ("Sakai") [US 5,420,703].

Regarding claim 11, Spivey discloses the following claim limitations:

A device comprising *[Figure 1]*: a pixel portion having a plurality of pixels each comprising a photoelectric conversion element *[Column 4 Lines 5-10: electronic signals ... photons absorbed]*; and means for determining a defective pixel *[Column 15 Lines 14-16]*, wherein the defective pixel is determined by the steps of: obtaining a first image signal of each of the plurality of pixels by using the photoelectric conversion element *[Column 15 Lines 23-25: white field images]*; obtaining a second image signal of each of the plurality of pixels by using the photoelectric conversion element *[Column 15 Lines 23-25: dark field images]*; calculating a first difference between the first and second image signals of each of the plurality of pixels *[Column 15 Lines 27-30: subtracted]*; obtaining at least a value selected from a modal value, an average value and a maximum value of the first difference of each of the plurality of pixels *[Column 15 Lines 27-30: averaged]*; and determining whether each of the plurality of pixels is the defective pixel by obtaining a second difference between the first difference of each of the plurality of pixels and the value selected from a modal value, an average value and a maximum value of the first difference of the plurality of pixels *[Column 15 Lines 30-34: variation]*.

Spivey does not explicitly disclose the following claim limitations:

Reading a first calibration sheet to obtain a first image signal.

Reading a second calibration sheet to obtain a second image signal.

However, in the same field of endeavor Sakai discloses the deficient claim limitations, as follows:

> Reading a first calibration sheet to obtain a first image signal *[Column 4 Lines 17-18: white board]*. Reading a second calibration sheet to obtain a second image signal *[Column 4 Lines 17-18: black board]*.

Spivey and Sakai are combinable because they are from the same field of sensor calibration. It would have been obvious to one with ordinary skill in the art at the time of invention to modify the teachings of Spivey with Sakai to read white and black sheets to obtain white and black image signals, the motivation being to correct sensor sensitivity variations by amount of light that is reflected *[Column 4 Lines 58-63]*.

Regarding claim 12, Spivey discloses the following claim limitations:

> A device comprising *[Figure 1]*: a pixel portion having a plurality of pixels each comprising a photoelectric conversion element *[Column 4 Lines 5-10: electronic signals ... photons absorbed]*; and means for determining a defective pixel *[Column 15 Lines 14-16]*, wherein the defective pixel is determined by the steps of: obtaining a first image signal of each of the plurality of pixels by using the photoelectric conversion element *[Column 15 Lines 23-25: white field images]*; obtaining a second image signal of each of the plurality of pixels by using the photoelectric conversion element *[Column 15 Lines 23-25: dark field images]*; calculating a first difference between the first and second image signals of each of the plurality of pixels *[Column 15 Lines 27-30: subtracted]*; obtaining at least a value selected from a modal value, an average value and a maximum value of the first difference of each of the plurality of pixels *[Column 15*

Lines 27-30: averaged]; and determining whether each of the plurality of pixels is the defective pixel by obtaining a second difference between the first difference of each of the plurality of pixels and the value selected from a modal value, an average value and a maximum value of the first difference of the plurality of pixels *[Column 15 Lines 30-34: variation]*.

Spivey does not explicitly disclose the following claim limitations:

Reading a first calibration sheet to obtain a first image signal.

Reading a second calibration sheet to obtain a second image signal.

However, in the same field of endeavor Sakai discloses the deficient claim limitations, as follows:

Reading a first calibration sheet to obtain a first image signal *[Column 4 Lines 17-18: white board]*. Reading a second calibration sheet to obtain a second image signal *[Column 4 Lines 17-18: black board]*.

Spivey and Sakai are combinable because they are from the same field of sensor calibration. It would have been obvious to one with ordinary skill in the art at the time of invention to modify the teachings of Spivey with Sakai to read white and black sheets to obtain white and black image signals, the motivation being to correct sensor sensitivity variations by amount of light that is reflected *[Column 4 Lines 58-63]*.

Neither Spivey nor Sakai explicitly disclose the following:

Calculating the first ratio and the second ratio.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to substitute the subtraction operation with a ratio operation. Applicant has not disclosed that ratios provide for superior results over subtraction, is used for a particular purpose or

solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with subtraction because it the variation (i.e. variance) that ultimately determines whether a pixel is defective or not, it makes no difference how the variance is obtained. Hence, a variance obtained from via subtraction has the same effect as the variance obtained from via ratios. Therefore, it would have been obvious to one of ordinary skill in this art to modify Spivey to use ratios instead of subtraction to obtain the invention as specified in claim 12.

Regarding claim 13, Sakai meets all the claim limitations, as follows:

> A device according to claim 11, wherein the device is at least a device selected from the group of a hand scanner, a video camera, a digital still camera, a notebook computer, a mobile computer, a cellular phone, a portable game machine and an electronic book *[1 on Figure 1]*.

Regarding claim 14, Sakai meets all the claim limitations, as follows:

> A device according to claim 12, wherein the device is at least a device selected from the group of a hand scanner, a video camera, a digital still camera, a notebook computer, a mobile computer, a cellular phone, a portable game machine and an electronic book *[1 on Figure 1]*.

[5] Claims 15-18 and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spivey et al. ("Spivey") [US 5,886,353] in view of Sakai et al. ("Sakai") [US 5,420,703] further in view of Levine [US 4,562,473].

Regarding claim 15, Spivey discloses the following claim limitations:

> A device comprising *[Figure 1]*: a pixel portion having a plurality of pixels each comprising a photoelectric conversion element *[Column 4 Lines 5-10: electronic signals ... photons absorbed]*; and means for determining a defective pixel *[Column 15 Lines 14-16]*, wherein the defective pixel is determined by the steps of: obtaining a first image signal of each of the plurality of pixels by using the photoelectric conversion element *[Column 15 Lines 23-25: white field images]*; obtaining a second image signal of each of the plurality of pixels by using the photoelectric conversion element *[Column 15 Lines 23-25: dark field images]*; calculating a first difference between the first and second image signals of each of the plurality of pixels *[Column 15 Lines 27-30: subtracted]*; obtaining at least a value selected from a modal value, an average value and a maximum value of the first difference of each of the plurality of pixels *[Column 15 Lines 27-30: averaged]*; and determining whether each of the plurality of pixels is the defective pixel by obtaining a second difference between the first difference of each of the plurality of pixels and the value selected from a modal value, an average value and a maximum value of the first difference of the plurality of pixels *[Column 15 Lines 30-34: variation]*.

Spivey does not explicitly disclose the following claim limitations:

> Reading a second calibration sheet to obtain a second image signal.

However, in the same field of endeavor Sakai discloses the deficient claim limitations, as follows:

> Reading a second calibration sheet to obtain a second image signal *[Column 4 Lines 17-18: black board]*.

Spivey and Sakai are combinable because they are from the same field of sensor calibration. It would have been obvious to one with ordinary skill in the art at the time of invention to modify the teachings of Spivey with Sakai to read a black sheet to obtain a black image signal, the motivation being to correct sensor sensitivity variations by amount of light that is reflected *[Column 4 Lines 58-63]*.

Neither Spivey nor Sakai explicitly disclose the following:

> The first image signal of each of the plurality of pixels is obtained while $T > \{C \times Vp/Id\}$ is satisfied, where T is an accumulation time, C is a capacitance of the photoelectric conversion element, Vp is a voltage applied to the photoelectric conversion element.

However, in the same field of endeavor Levine discloses the deficient claim limitations, as follows:

> Longer accumulation time shifts the black level toward a white level, due to dark current *[Column 1 Lines 22-26]*.

Spivey, Sakai and Levine are combinable because they are from the same field of sensor calibration.

It would have been obvious to one with ordinary skill in the art at the time of invention to modify the teachings of Spivey and Sakai with Levine to obtain a first image signal of each of the plurality of pixels when $T > \{C \times Vp/Id\}$. First, it is well established that $T > \{C \times Vp/Id\}$

is the time required to completely discharge the capacitive element in the photodiode [See, Tsuruta et al. ("Tsuruta") [US 5,233,180] at Column 10 Equation 19]. Second, longer accumulation time leads to dark current based capacitive discharging, leading to conversion from a black level to a white level. Hence, one of ordinary skill would understand that complete discharging of photodiode (i.e. T>{C x Vp/Id}) would result in a white image signal. Therefore, one of ordinary skill would upon reading Levine's disclosure understand that Spivey's white image signal can be obtained through complete discharge of the photodiode. The motivation to combine Spivey, Sakai and Levine being the elimination of a white calibration sheet.

Regarding claim 16, Spivey discloses the following claim limitations:

> A device comprising *[Figure 1]*: a pixel portion having a plurality of pixels each comprising a photoelectric conversion element *[Column 4 Lines 5-10: electronic signals ... photons absorbed]*; and means for determining a defective pixel *[Column 15 Lines 14-16]*, wherein the defective pixel is determined by the steps of: obtaining a first image signal of each of the plurality of pixels by using the photoelectric conversion element *[Column 15 Lines 23-25: white field images]*; obtaining a second image signal of each of the plurality of pixels by using the photoelectric conversion element *[Column 15 Lines 23-25: dark field images]*; calculating a first difference between the first and second image signals of each of the plurality of pixels *[Column 15 Lines 27-30: subtracted]*; obtaining at least a value selected from a modal value, an average value and a maximum value of the first difference of each of the plurality of pixels *[Column 15 Lines 27-30: averaged]*; and determining whether each of the plurality of pixels is the

defective pixel by obtaining a second difference between the first difference of each of the plurality of pixels and the value selected from a modal value, an average value and a maximum value of the first difference of the plurality of pixels *[Column 15 Lines 30-34: variation]*.

Spivey does not explicitly disclose the following claim limitations:

Reading a second calibration sheet to obtain a second image signal.

However, in the same field of endeavor Sakai discloses the deficient claim limitations, as follows:

Reading a second calibration sheet to obtain a second image signal *[Column 4 Lines 17-18: black board]*.

Spivey and Sakai are combinable because they are from the same field of sensor calibration. It would have been obvious to one with ordinary skill in the art at the time of invention to modify the teachings of Spivey with Sakai to read a black sheet to obtain a black image signal, the motivation being to correct sensor sensitivity variations by amount of light that is reflected *[Column 4 Lines 58-63]*.

Neither Spivey nor Sakai explicitly disclose the following:

The first image signal of each of the plurality of pixels is obtained while $T > \{C \times Vp/Id\}$ is satisfied, where T is an accumulation time, C is a capacitance of the photoelectric conversion element, Vp is a voltage applied to the photoelectric conversion element.

However, in the same field of endeavor Levine discloses the deficient claim limitations, as follows:

Longer accumulation time shifts the black level toward a white level, due to dark current *[Column 1 Lines 22-26]*.

Spivey, Sakai and Levine are combinable because they are from the same field of sensor calibration.

It would have been obvious to one with ordinary skill in the art at the time of invention to modify the teachings of Spivey and Sakai with Levine to obtain a first image signal of each of the plurality of pixels when $T>\{C \times Vp/Id\}$. First, it is well established that $T>\{C \times Vp/Id\}$ is the time required to completely discharge the capacitive element in the photodiode [See, Tsuruta et al. ("Tsuruta") [US 5,233,180] at Column 10 Equation 19]. Second, longer accumulation time leads to dark current based capacitive discharging, leading to conversion from a black level to a white level. Hence, one of ordinary skill would understand that complete discharging of photodiode (i.e. $T>\{C \times Vp/Id\}$) would result in a white image signal. Therefore, one of ordinary skill would upon reading Levine's disclosure understand that Spivey's white image signal can be obtained through complete discharge of the photodiode. The motivation to combine Spivey, Sakai and Levine being the elimination of a white calibration sheet.

Spivey, Sakai and Levine does not explicitly disclose expressly the following:

Calculating the first ratio and the second ratio.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to substitute the subtraction operation with a ratio operation. Applicant has not disclosed that ratios provide for superior results over subtraction, is used for a particular purpose or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with subtraction because it the variation (i.e.

variance) that ultimately determines whether a pixel is defective or not, it makes no difference how the variance is obtained. Hence, a variance obtained from via subtraction has the same effect as the variance obtained from via ratios. Therefore, it would have been obvious to one of ordinary skill in this art to modify Spivey to use ratios instead of subtraction to obtain the invention as specified in claim 16.

Regarding claim 17, Spivey discloses the following claim limitations:

> A device comprising *[Figure 1]*: a pixel portion having a plurality of pixels each comprising a photoelectric conversion element *[Column 4 Lines 5-10: electronic signals ... photons absorbed]*; and means for determining a defective pixel *[Column 15 Lines 14-16]*, wherein the defective pixel is determined by the steps of: obtaining a first image signal of each of the plurality of pixels by using the photoelectric conversion element *[Column 15 Lines 23-25: dark field images]*; obtaining a second image signal of each of the plurality of pixels by using the photoelectric conversion element *[Column 15 Lines 23-25: white field images]*; calculating a first difference between the first and second image signals of each of the plurality of pixels *[Column 15 Lines 27-30: subtracted]*; obtaining at least a value selected from a modal value, an average value and a maximum value of the first difference of each of the plurality of pixels *[Column 15 Lines 27-30: averaged]*; and determining whether each of the plurality of pixels is the defective pixel by obtaining a second difference between the first difference of each of the plurality of pixels and the value selected from a modal value, an average value and a maximum value of the first difference of the plurality of pixels *[Column 15 Lines 30-34: variation]*.

Spivey does not explicitly disclose the following claim limitations:

Reading a second calibration sheet to obtain a second image signal.

However, in the same field of endeavor Sakai discloses the deficient claim limitations, as follows:

Reading a second calibration sheet to obtain a second image signal *[Column 4 Lines 17-18: white board]*.

Spivey and Sakai are combinable because they are from the same field of sensor calibration. It would have been obvious to one with ordinary skill in the art at the time of invention to modify the teachings of Spivey with Sakai to read a white sheet to obtain a white image signal, the motivation being to correct sensor sensitivity variations by amount of light that is reflected *[Column 4 Lines 58-63]*.

Neither Spivey nor Sakai explicitly disclose the following:

The first image signal of each of the plurality of pixels is obtained while an accumulation time of the photoelectric conversion element is 0

However, in the same field of endeavor Levine discloses the deficient claim limitations, as follows:

Longer accumulation time shifts the black level toward a white level, due to dark current *[Column 1 Lines 22-26]*.

Spivey, Sakai and Levine are combinable because they are from the same field of sensor calibration.

It would have been obvious to one with ordinary skill in the art at the time of invention to modify the teachings of Spivey and Sakai with Levine to obtain a first image signal while the accumulation time is 0. In order to obtain a true black level the time needs to be 0, else the

effects of dark current would cause the black level to fade. The motivation to combine Spivey, Sakai and Levine being the elimination of a black calibration sheet.

Regarding claim 18, Spivey discloses the following claim limitations:

A device comprising *[Figure 1]*: a pixel portion having a plurality of pixels each comprising a photoelectric conversion element *[Column 4 Lines 5-10: electronic signals ... photons absorbed]*; and means for determining a defective pixel *[Column 15 Lines 14-16]*, wherein the defective pixel is determined by the steps of: obtaining a first image signal of each of the plurality of pixels by using the photoelectric conversion element *[Column 15 Lines 23-25: dark field images]*; obtaining a second image signal of each of the plurality of pixels by using the photoelectric conversion element *[Column 15 Lines 23-25: white field images]*; calculating a first difference between the first and second image signals of each of the plurality of pixels *[Column 15 Lines 27-30: subtracted]*; obtaining at least a value selected from a modal value, an average value and a maximum value of the first difference of each of the plurality of pixels *[Column 15 Lines 27-30: averaged]*; and determining whether each of the plurality of pixels is the defective pixel by obtaining a second difference between the first difference of each of the plurality of pixels and the value selected from a modal value, an average value and a maximum value of the first difference of the plurality of pixels *[Column 15 Lines 30-34: variation]*.

Spivey does not explicitly disclose the following claim limitations:

Reading a second calibration sheet to obtain a second image signal.

However, in the same field of endeavor Sakai discloses the deficient claim limitations, as follows:

> Reading a second calibration sheet to obtain a second image signal *[Column 4 Lines 17-18: white board]*.

Spivey and Sakai are combinable because they are from the same field of sensor calibration. It would have been obvious to one with ordinary skill in the art at the time of invention to modify the teachings of Spivey with Sakai to read a white sheet to obtain a white image signal, the motivation being to correct sensor sensitivity variations by amount of light that is reflected *[Column 4 Lines 58-63]*.

Neither Spivey nor Sakai explicitly disclose the following:

> The first image signal of each of the plurality of pixels is obtained while an accumulation time of the photoelectric conversion element is 0

However, in the same field of endeavor Levine discloses the deficient claim limitations, as follows:

> Longer accumulation time shifts the black level toward a white level, due to dark current *[Column 1 Lines 22-26]*.

Spivey, Sakai and Levine are combinable because they are from the same field of sensor calibration.

It would have been obvious to one with ordinary skill in the art at the time of invention to modify the teachings of Spivey and Sakai with Levine to obtain a first image signal while the accumulation time is 0. In order to obtain a true black level the time needs to be 0, else the effects of dark current would cause the black level to fade. The motivation to combine Spivey, Sakai and Levine being the elimination of a black calibration sheet.

Spivey, Sakai and Levine does not explicitly disclose expressly the following:

Calculating the first ratio and the second ratio.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to substitute the subtraction operation with a ratio operation. Applicant has not disclosed that ratios provide for superior results over subtraction, is used for a particular purpose or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with subtraction because it the variation (i.e. variance) that ultimately determines whether a pixel is defective or not, it makes no difference how the variance is obtained. Hence, a variance obtained from via subtraction has the same effect as the variance obtained from via ratios. Therefore, it would have been obvious to one of ordinary skill in this art to modify Spivey to use ratios instead of subtraction to obtain the invention as specified in claim 18.

Regarding claim 21, Sakai meets all the claim limitations, as follows:

A device according to claim 15, wherein the device is at least a device selected from the group of a hand scanner, a video camera, a digital still camera, a notebook computer, a mobile computer, a cellular phone, a portable game machine and an electronic book *[1 on Figure 1]*.

Regarding claim 22-24, all claimed limitations are set forth and rejected as per discussion for claim 21.

[6] Claims 19, 20, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spivey et al. ("Spivey") [US 5,886,353] in view of Levine [US 4,562,473].

Regarding claim 19, Spivey discloses the following claim limitations:

> A device comprising *[Figure 1]*: a pixel portion having a plurality of pixels each comprising a photoelectric conversion element *[Column 4 Lines 5-10: electronic signals ... photons absorbed]*; and means for determining a defective pixel *[Column 15 Lines 14-16]*, wherein the defective pixel is determined by the steps of: obtaining a first image signal of each of the plurality of pixels by using the photoelectric conversion element *[Column 15 Lines 23-25: white field images]*; obtaining a second image signal of each of the plurality of pixels by using the photoelectric conversion element *[Column 15 Lines 23-25: dark field images]*; calculating a first difference between the first and second image signals of each of the plurality of pixels *[Column 15 Lines 27-30: subtracted]*; obtaining at least a value selected from a modal value, an average value and a maximum value of the first difference of each of the plurality of pixels *[Column 15 Lines 27-30: averaged]*; and determining whether each of the plurality of pixels is the defective pixel by obtaining a second difference between the first difference of each of the plurality of pixels and the value selected from a modal value, an average value and a maximum value of the first difference of the plurality of pixels *[Column 15 Lines 30-34: variation]*.

Spivey does not explicitly disclose the following:

> The first image signal of each of the plurality of pixels is obtained while $T > \{C \times Vp/Id\}$ is satisfied, where T is an accumulation time, C is a capacitance of the photoelectric conversion element, Vp is a voltage applied to the photoelectric

> conversion element, and wherein the second image signal of each of the plurality of pixels is obtained while an accumulation time of the photoelectric conversion element is 0.

However, in the same field of endeavor Levine discloses the deficient claim limitations, as follows:

> Longer accumulation time shifts the black level toward a white level, due to dark current *[Column 1 Lines 22-26]*.

Spivey and Levine are combinable because they are from the same field of sensor calibration. It would have been obvious to one with ordinary skill in the art at the time of invention to modify the teachings of Spivey and Sakai with Levine to obtain a first image signal of each of the plurality of pixels when $T>\{C \times Vp/Id\}$. First, it is well established that $T>\{C \times Vp/Id\}$ is the time required to completely discharge the capacitive element in the photodiode [See, Tsuruta et al. ("Tsuruta") [US 5,233,180] at Column 10 Equation 19]. Second, longer accumulation time leads to dark current based capacitive discharging, leading to conversion from a black level to a white level. Hence, one of ordinary skill would understand that complete discharging of photodiode (i.e. $T>\{C \times Vp/Id\}$) would result in a white image signal. Therefore, one of ordinary skill would upon reading Levine's disclosure understand that Spivey's white image signal can be obtained through complete discharge of the photodiode. It would have been also obvious to one with ordinary skill in the art at the time of invention to modify the teachings of Spivey and Sakai with Levine to obtain a second image signal while the accumulation time is 0. In order to obtain a true black level the time needs to be 0, else the effects of dark current would cause the black level to fade. The

motivation to combine Spivey and Levine being an alternative method for generating white and black image signals.

Regarding claim 20, Spivey discloses the following claim limitations:

A device comprising *[Figure 1]*: a pixel portion having a plurality of pixels each comprising a photoelectric conversion element *[Column 4 Lines 5-10: electronic signals ... photons absorbed]*; and means for determining a defective pixel *[Column 15 Lines 14-16]*, wherein the defective pixel is determined by the steps of: obtaining a first image signal of each of the plurality of pixels by using the photoelectric conversion element *[Column 15 Lines 23-25: white field images]*; obtaining a second image signal of each of the plurality of pixels by using the photoelectric conversion element *[Column 15 Lines 23-25: dark field images]*; calculating a first difference between the first and second image signals of each of the plurality of pixels *[Column 15 Lines 27-30: subtracted]*; obtaining at least a value selected from a modal value, an average value and a maximum value of the first difference of each of the plurality of pixels *[Column 15 Lines 27-30: averaged]*; and determining whether each of the plurality of pixels is the defective pixel by obtaining a second difference between the first difference of each of the plurality of pixels and the value selected from a modal value, an average value and a maximum value of the first difference of the plurality of pixels *[Column 15 Lines 30-34: variation]*.

Spivey does not explicitly disclose the following:

The first image signal of each of the plurality of pixels is obtained while $T > \{C \times Vp/Id\}$ is satisfied, where T is an accumulation time, C is a capacitance of the

> photoelectric conversion element, Vp is a voltage applied to the photoelectric conversion element, and wherein the second image signal of each of the plurality of pixels is obtained while an accumulation time of the photoelectric conversion element is 0.

However, in the same field of endeavor Levine discloses the deficient claim limitations, as follows:

> Longer accumulation time shifts the black level toward a white level, due to dark current *[Column 1 Lines 22-26]*.

Spivey and Levine are combinable because they are from the same field of sensor calibration. It would have been obvious to one with ordinary skill in the art at the time of invention to modify the teachings of Spivey and Sakai with Levine to obtain a first image signal of each of the plurality of pixels when $T>\{C \times Vp/Id\}$. First, it is well established that $T>\{C \times Vp/Id\}$ is the time required to completely discharge the capacitive element in the photodiode [See, Tsuruta et al. ("Tsuruta") [US 5,233,180] at Column 10 Equation 19]. Second, longer accumulation time leads to dark current based capacitive discharging, leading to conversion from a black level to a white level. Hence, one of ordinary skill would understand that complete discharging of photodiode (i.e. $T>\{C \times Vp/Id\}$) would result in a white image signal. Therefore, one of ordinary skill would upon reading Levine's disclosure understand that Spivey's white image signal can be obtained through complete discharge of the photodiode. It would have been also obvious to one with ordinary skill in the art at the time of invention to modify the teachings of Spivey and Sakai with Levine to obtain a second image signal while the accumulation time is 0. In order to obtain a true black level the time needs to be 0, else the effects of dark current would cause the black level to fade. The

motivation to combine Spivey and Levine being an alternative method for generating white and black image signals.

Spivey and Levine does not explicitly disclose expressly the following:

Calculating the first ratio and the second ratio.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to substitute the subtraction operation with a ratio operation. Applicant has not disclosed that ratios provide for superior results over subtraction, is used for a particular purpose or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with subtraction because it the variation (i.e. variance) that ultimately determines whether a pixel is defective or not, it makes no difference how the variance is obtained. Hence, a variance obtained from via subtraction has the same effect as the variance obtained from via ratios. Therefore, it would have been obvious to one of ordinary skill in this art to modify Spivey to use ratios instead of subtraction to obtain the invention as specified in claim 20.

Regarding claim 25, Levine meets all the claim limitations, as follows:

> A device according to claim 19, wherein the device is at least a device selected from the group of a hand scanner, a video camera, a digital still camera, a notebook computer, a mobile computer, a cellular phone, a portable game machine and an electronic book *[Column 5 Line 19]*.

Regarding claim 26, Levine meets all the claim limitations, as follows:

A device according to claim 20, wherein the device is at least a device selected from the group of a hand scanner, a video camera, a digital still camera, a notebook computer, a mobile computer, a cellular phone, a portable game machine and an electronic book *[Column 5 Line 19]*.

Contact Information

[7] Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mr. Sath V. Perungavoor whose telephone number is (571) 272-7455. The examiner can normally be reached on Monday to Friday from 8:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Bhavesh M. Mehta whose telephone number is (571) 272-7453, can be reached on Monday to Friday from 9:00am to 5:00pm. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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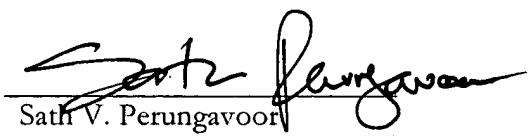
Dated: December 1, 2005

By: 

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